



Help, I've Fallen and Can't Get Up! Evidence-Based Strategies for Fall Prevention in Community- Dwelling Older Adults

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Falls Are Prevalent

33% aged 65+ years

50% aged 80+ years

Rates are highest in women

40-50% of fallers will have repeat falls



Falls Are Morbid Events

Falls are the 8th leading cause of death in older adults¹

Mortality risk increases with advancing age, especially in those aged 80+

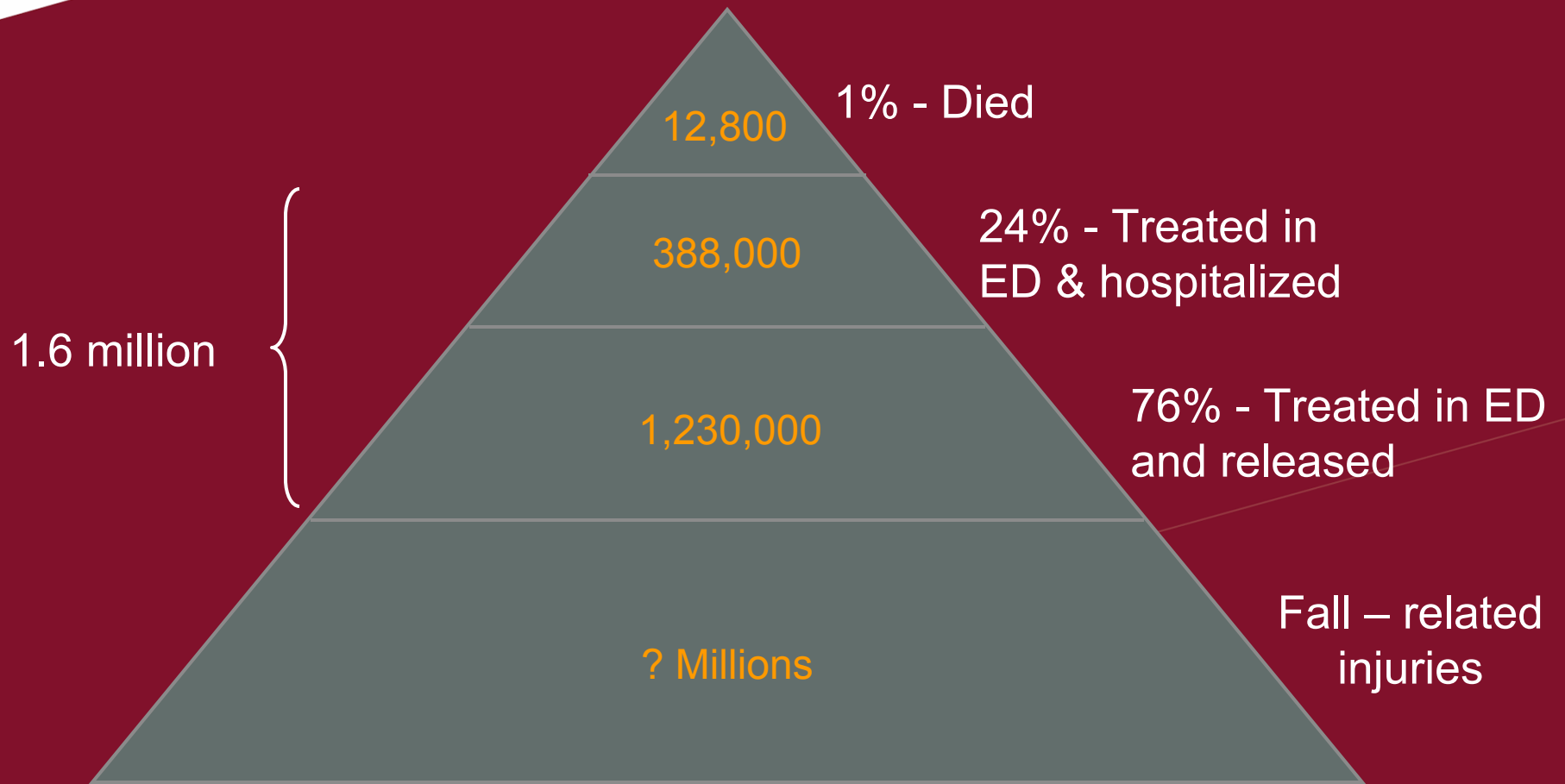
White and black males have highest death rates

Black women have lowest death rate

33% of hip fracture patients will die within 1 year of injury, with rates highest in men²



Fatal and Nonfatal Fall Injuries Among People 65+, U.S. 2002





Severity of Fall Injuries

<u>Injury</u>	<u>% of All Falls</u>
Minor soft tissue injuries:	30-56
Serious injuries:	10-15
Fractures:	2-10
Hip Fracture:	1-2

Other common sites:

–Vertebrae, forearm, leg, ankle, pelvis, upper arm, & hand

Injury rates highest in women with fracture diagnoses 2.2 times more common



Falls Lead to Functional Decline

25-75% of hip fracture patients do not recover prefracture level of function in ambulation or activities of daily living¹

Fallers have greater functional decline at 1 and 3 yrs than nonfallers²

¹Magaziner J et al. *J Gerontol Med Sci* 1990;45:M101-M107

²Tinetti ME & Williams CS. *J Gerontol A Biol Sci Med Sci*, 1998;53;M112-M119



Falls Lead to Fear and Loss of Confidence

In a large population-based study of adults aged 72 and over¹

- 24% report a fear of falling
- 19% restrict activity because of their fear

In other studies, fear of falling:

- Increases with age
- Is higher in women
- Is present both nonfallers and fallers



Falls are Expensive

\$7.8 billion in total direct medical costs of fall-related care for adults aged 65+ in adjusted 2002 dollars (using 1997 fall & cost data)¹

Acute medical care costs:²

- Hospitalization: \$17,483
- Emergency Department visit: \$ 236
- Outpatient office visit: \$ 412

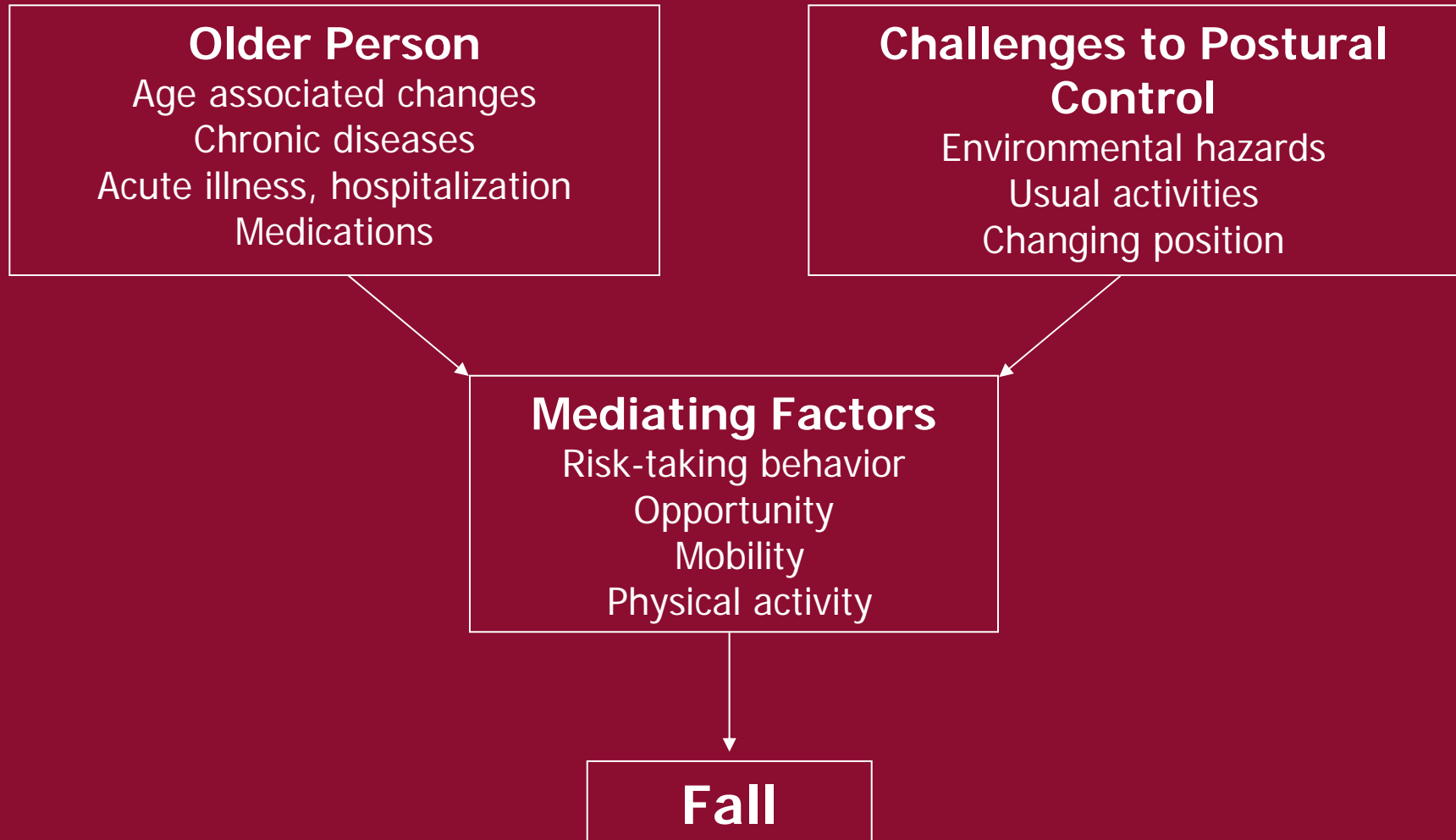


Falls Affect Others

Impact on caregiver

- Emotional
- Lost productivity
- Financial cost

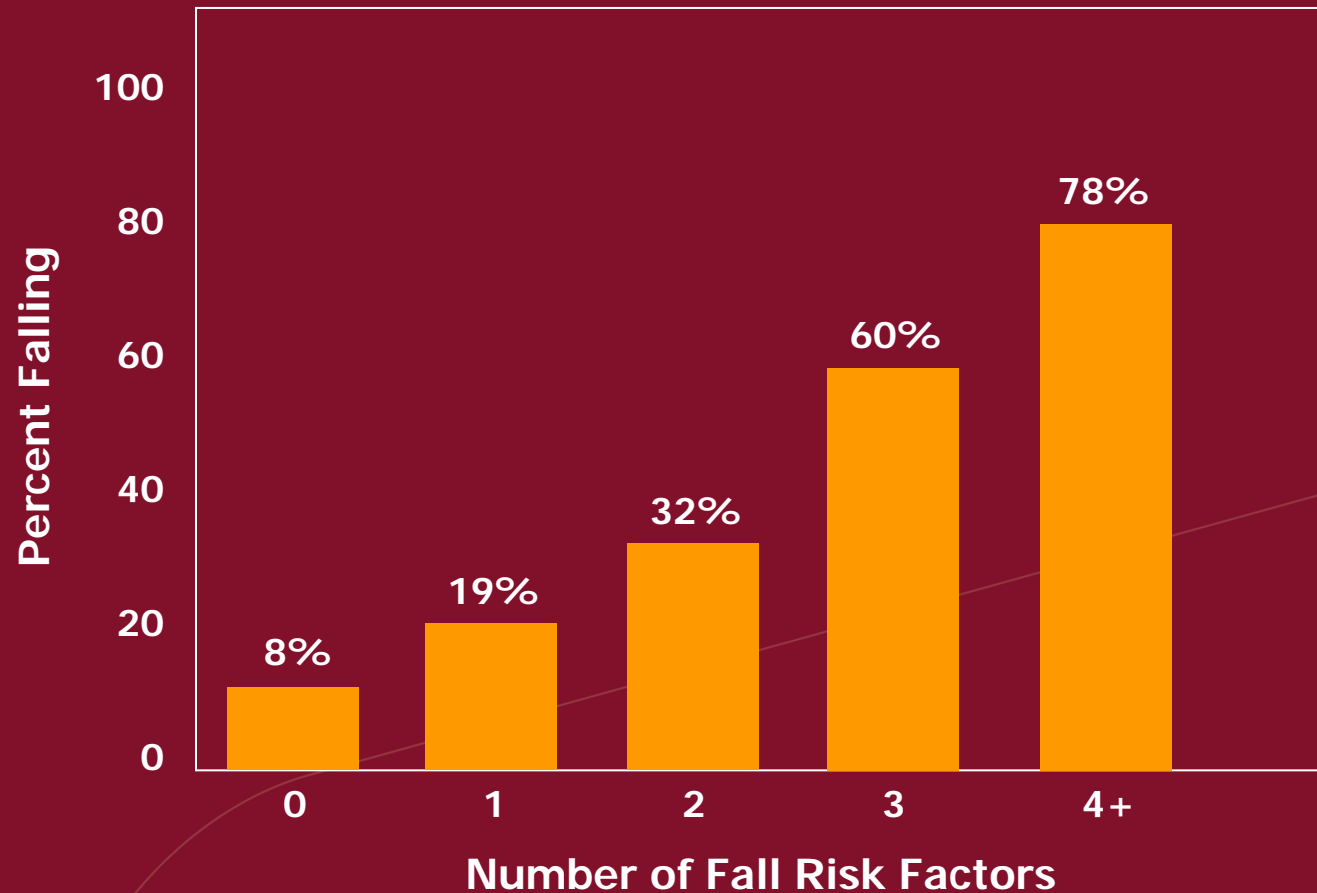
Fall Etiology: Interaction Between Multiple Factors



King MB & Tinetti ME. *J Am Geriatr Soc* 1995; 43:1146-1154

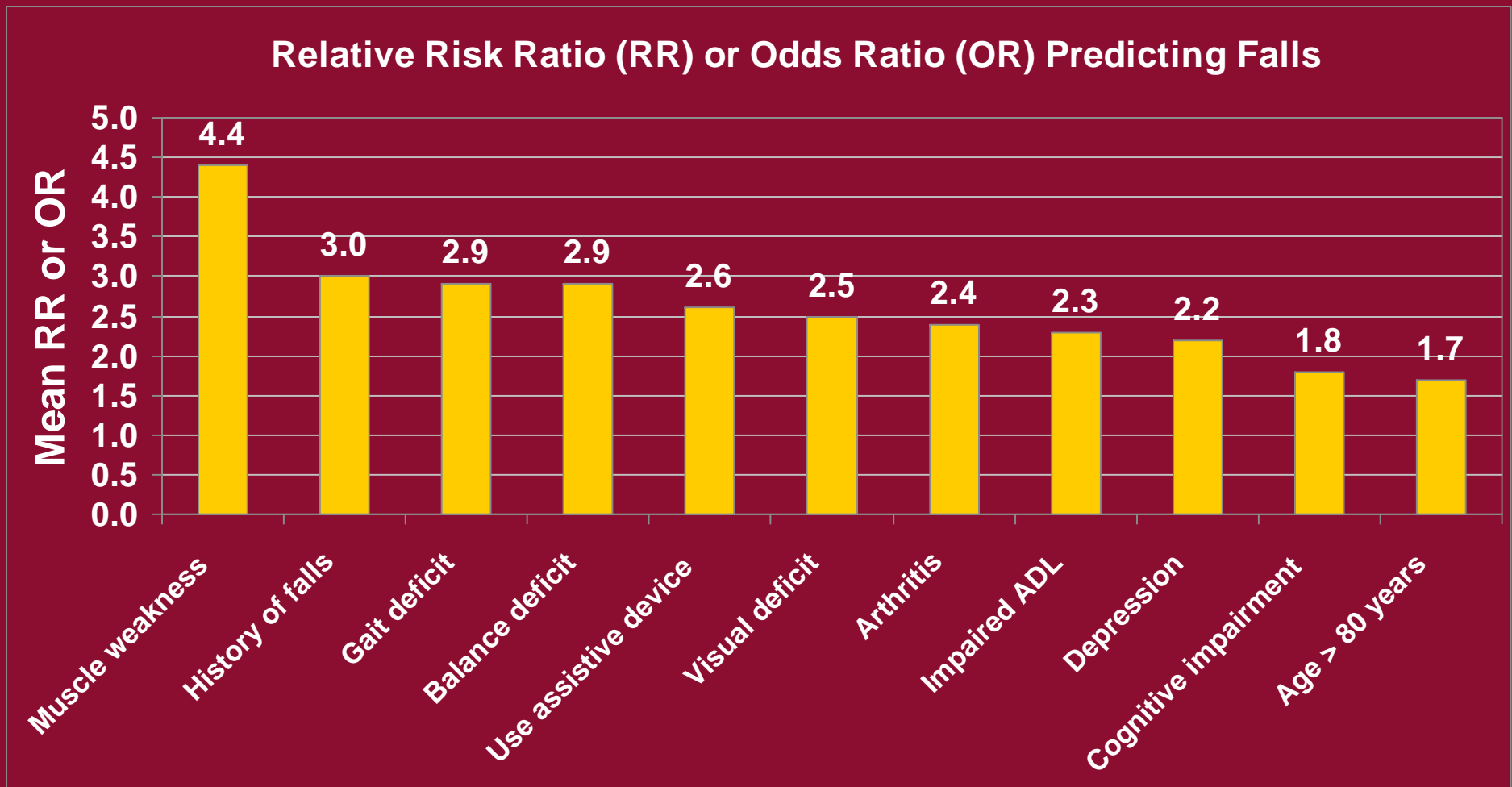


Falls are Predictable



Risk Factors for Falls:

(N = 16 Multivariate Studies)





Medication Use Increases Fall Risk

4 or more medications

Recent dosage change

Drug type:

- Neuroleptics (especially phenothiazines)
- Sedatives, hypnotics (including benzodiazepines)
- Antidepressants (eg, TCAs, MAOIs, SSRIs, SNRIs)
- Antiarrhythmics (Class 1A)
 - Quinidine, procainamide, disopyramide
- Anticonvulsants
- Glitazones
- Alcohol



The Environment Can Cause Falls

Slippery or uneven surfaces

Poor lighting (dim, glare)

Cluttered pathways

Tripping hazards (cords, throw rugs)

Unstable furniture (eg, too low or high, on casters, pedestal tables)

Shelves too high or low

Clothing and footwear



Fall Prevention Principles

Identify high risk individuals

Treat underlying disease

Reduce modifiable fall risk factors

Promote maximal functional ability and mobility

Optimize bone strength and protection



Cochrane Review (2003): What Interventions Work?

In a review of 62 randomized controlled trials, strategies determined as likely to be effective were:

- Multidisciplinary, comprehensive risk factor screening and intervention programs
 - Unselected populations in the community
 - Those with history of falling
 - Those with known risk factors



Cochrane Review (2003): What Interventions Work?

Exercise for balance and strength individually prescribed by a trained professional

Tai Chi group exercise program

Home hazard assessment & modification professionally prescribed for the older faller

Discontinuation of psychotropic medication



Rand Meta-Analysis of Fall Prevention Trials (2004)

In a review of 40 randomized controlled trials:

- Combining all types of interventions, there was a significant reduction in risk of falling and monthly rate of falling
- Most effective: multifactorial assessment and management program
- Next most effective: exercise (reduces falls by 13%-24%)
- No effect: home modifications and education



Optimizing Bone Strength: Protecting Against Fractures

Weight-bearing exercise and strength training

If no contraindications, minimum supplementation of calcium (1,200 mg/d) and vitamin D (400-800 mg/d)

However, evidence from the Women's Health Initiative using calcium carbonate (1000 mg/d) plus vitamin D (400 IU/d) in 32,282 postmenopausal women aged 50-79 years reported:

- Although hip bone density was higher in the calcium plus vitamin D group than placebo, it did **NOT** significantly reduce hip fractures and it increased kidney stone risk



Optimizing Bone Strength: Protecting Against Fractures

For the older adult at high risk of fracture:

- Drug therapy
 - Bisphosphonate therapy (e.g., alendronate, risendronate)
 - Selective estrogen receptor modulators (raloxifene)
 - Hormone replacement therapy in selected patients
 - Synthetic parathyroid hormone (teriparatide)
 - Calcitonin in those with prior osteoporotic fractures
- Hip protectors

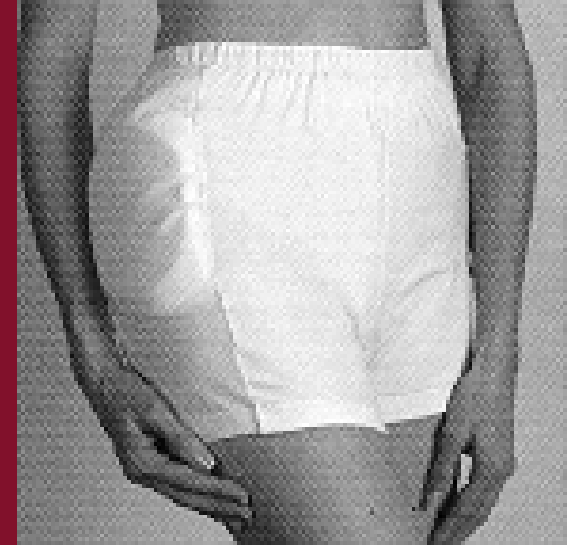


Cochrane Review: Hip Protectors (2004)

Meta-analysis of 14 randomized controlled trials of hip protectors in long-term care institution or community

No evidence on effectiveness from studies in which randomization was by individual patient within institution or by those living at home

Some evidence of effectiveness from cluster randomized studies for older adults at high risk of hip fracture living in institutional settings



Adherence/compliance is a problem which may be related to skin irritation, abrasion, and local discomfort



Fall Evaluation & Prevention Program Trial

National Institute of Nursing Research and Office of
Research on Women's Health, National Institutes of
Health (R01 NR05107)



Purpose

Test the efficacy of a multifactorial fall prevention program (exercise, education, tailored counseling) in reducing falls in community-dwelling older women deemed at risk for falling



Intervention Components

Comprehensive fall risk assessment by nurse practitioner

Home-based exercise program

Fall prevention education

Tailored risk reduction counseling

Provision of 2 nightlights



Program Length

- 28 week program in 2 phases:
 - 12 weeks, alternating weekly home visits and telephone calls by registered nurses
 - 16 weeks, tapered interactive computerized telephone calls for support and monitoring



Exercise Program

Incorporated principles from Transtheoretical Model of Behavior Change

Developing awareness

Helping relationship

Goal setting

Personal testimonies

Identifying rewards for exercise adherence

Exercise monitoring with daily logs

Teaching exercise relapse prevention strategies

Exercise regimen

- Walking program (30 minutes for minimum 5 days/week)
- Balance, strength, and coordination exercises



Exercises

12 repetitions, twice a week

Alternate knee touches

Sideway walking

Crossover stepping

Tandem walking

Toe lifts

Sit to stand*

Heel lifts*

Single leg stand*

Hip abduction*

Hip extension*

Step ups*

* Done while wearing weighted belt



Fall Prevention Education

Fall causes

Safety proofing home

Safe medication use

Taking time

- Avoiding rushing
- Getting up slowly
- Answering phone calls
- Walking on ice/
slippery surfaces

Balance tips for daily activities

Limiting alcohol use

Vision care and lighting

Foot care and shoe selection

Osteoporosis prevention

Urinary control strategies

Getting up from a fall



Tailored Risk Reduction Counseling

Based on comprehensive fall risk assessment

Written fall risk profile developed and shared

Counseling with mutual goal setting and action plan
for 3 fall risk factors

Referrals provided as needed to health care
providers, medical equipment suppliers, and
handimen services



Sample Characteristics

Mean age: 79 years (range 70-99)

98% white

60% \geq high school education

52% \geq \$20,000/year incomes

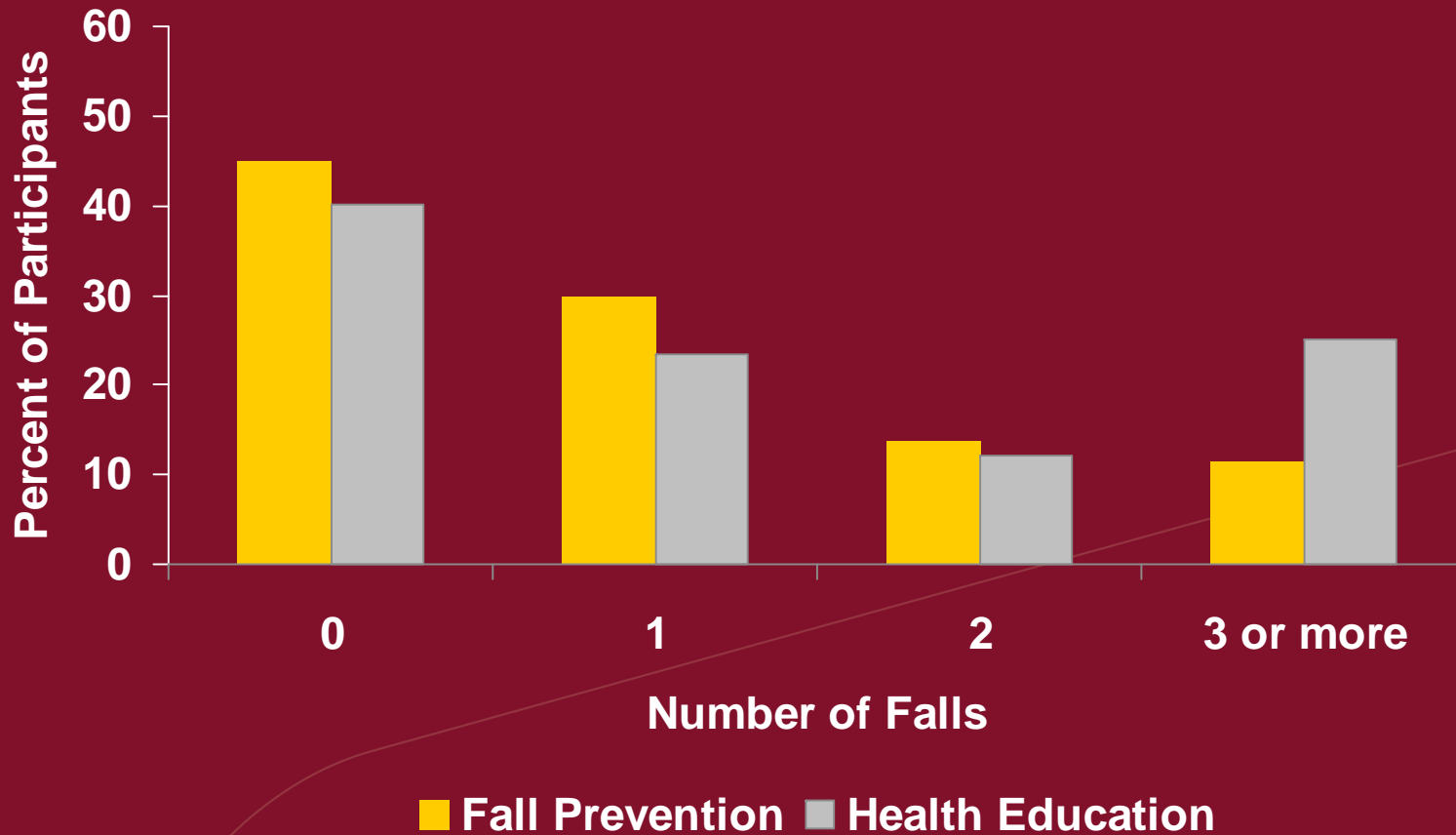
39% fell in past year

Average of 3 chronic conditions for which they took
3.5 drugs/week

8% used a cane or walker



Fall Frequency at 2-Years





Fall Rate Per 100 Person Years at 1- and 2-Years

Follow-Up	Fall Prevention	Health Education	Incidence Rate Ratio (95% Confidence Interval)
1-Year*	63.7	88.8	0.72 (0.54-0.96)
2-Year**	56.4	90.0	0.63 (0.51-0.77)

* $P < .01$

** $P < .001$

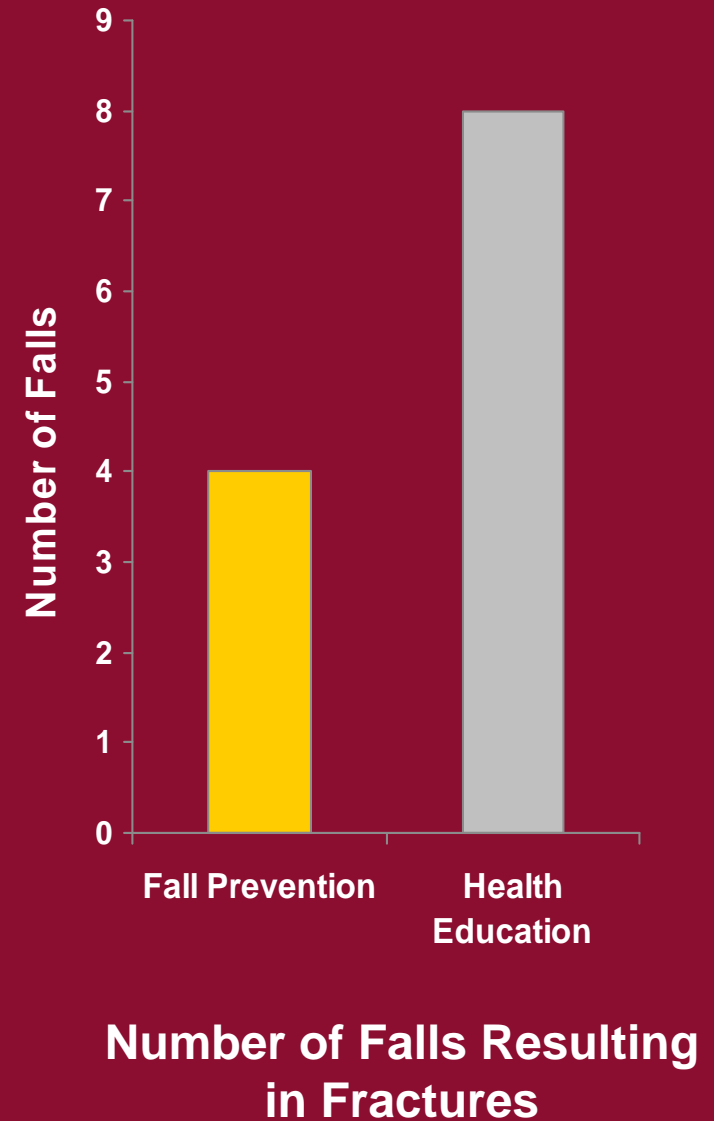
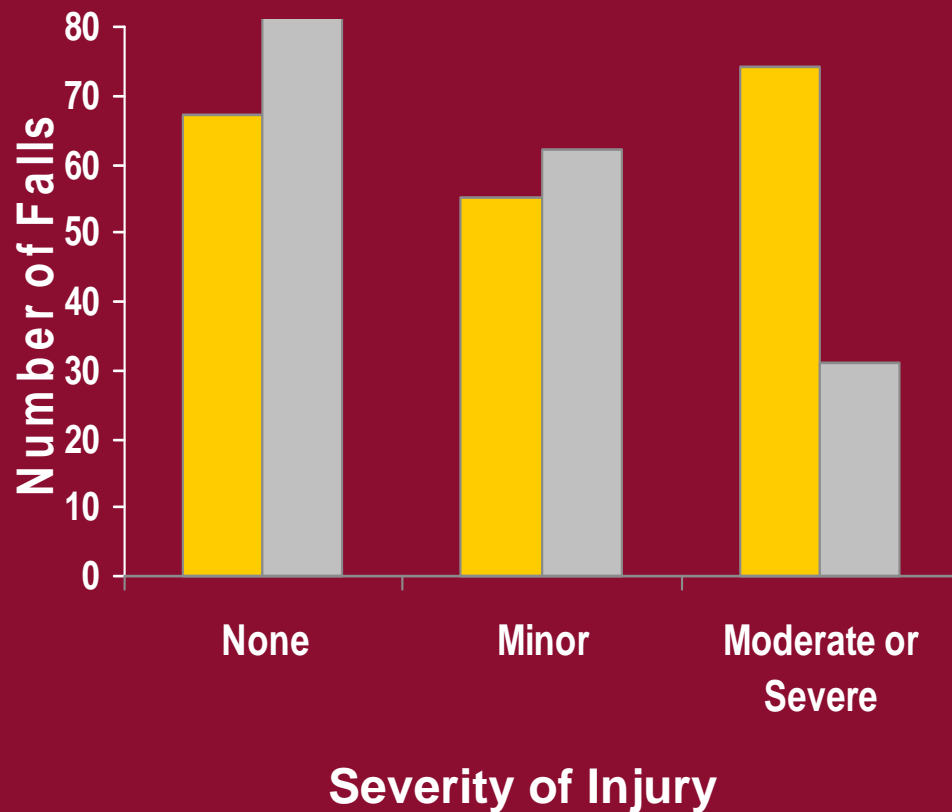
How Much Can the Fall Prevention Program Reduce Falls?

35% fall reduction at 1 and 2 years

Time Period	Risk Factors Highly Predictive of Falls
1-year	<ul style="list-style-type: none">•Older age•Number of falls in prior year•Number of medications with fall risk•Urge incontinence•Cardiovascular disease•Severe hearing loss•Poor vision•Stroke
2-years	<ul style="list-style-type: none">•Number of falls in prior year•Number of medications with fall risk•Poor vision

Fall-Related Injuries Over 2-Years

■ Fall Prevention (148 falls)
■ Health Education (238 falls)





Fall Rates per 100 Person-Years by Exercise Adherence at 2 Years

		Walking	
		Low	High
Balance	Low	63.7 (n=50)	58.0 (n=15)
	High	82.1 (n=16)	40.9 (n=50)



Conclusions

Falls are common, serious, and costly in older adults

Falls are multifactorial in origin, with several interacting causes

Falls are preventable with multicomponent programs most effective